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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/825,839	04/15/2004	Lee Teck Kheng	MI22-2460	9446
21567 7590 06/26/2008				
WELLS ST. JOHN P.S.				
601 W. FIRST AVENUE, SUITE 1300				
SPOKANE, WA 99201				
EXAMINER				
KALAM, ABUL				
ART UNIT		PAPER NUMBER		
2814				
MAIL DATE		DELIVERY MODE		
06/26/2008		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/825,839

Applicant(s)

KHENG, LEE TECK

Examiner

Abul Kalam

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 April 2008.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-4, 7, 8 and 57-67 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 2-4, 7, 8 and 57-67 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-8508)
Paper No(s)/Mail Date 4/7/08
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on April 7, 2008, has been entered.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

2. Claims 2, 7, 8, 57-59, 61, 66 and 67 are rejected under 35 U.S.C. 102(a) as being anticipated by Applicant's Admitted Prior Art (AAPA).

Regarding claim 7, AAPA discloses a semiconductor package in fig. 1, comprising:

an interposer 14 construction comprising a single dielectric support member 20, a plurality conductive circuit traces 17 contacting the single dielectric support member 20, wherein the entire structure of the single dielectric support member 20 is a single layer of dielectric material (§ [0004]);

a semiconductor die 12 electrically connected with at least one of the traces 17;

at least one of the circuit traces 17 being between the semiconductor die 12 and the dielectric support member 20;

the dielectric support member 20 having a first surface and an opposing second surface, fig. 1, the plurality of circuit traces 17 being over the first surface, fig. 1, openings (gaps between support member 20) extending through the second surface to at least some of the circuit traces 17;

contact pads 30 within one or more of the openings and in electrical connection with one or more of the circuit traces 17, the contact pads 30 being entirely contained within the openings, fig. 1, wherein an entirety of at least one of the contact pads 30 is elevationally spaced from at least one of the first and the second surfaces of the of the dielectric support member 20; and solder balls 36 in electrical connection with the contact pads 30.

Regarding claim 2, AAPA teaches the semiconductor package wherein the support member 20 is a photomask material (specification [0005]: "dry film photomask").

Regarding claim 8, AAPA discloses the semiconductor package wherein the dielectric support member 20 has a slit 50 extending therethrough; and the electrical connection of the semiconductor die 12 to said at least one of the circuit traces 17 includes one or more wire bonds 44, extending from the die 12, through the slit 50, and into at least one of the openings (fig. 1).

Regarding claims 57-59, AAPA discloses the semiconductor package wherein the entirety of the at least one contact pad 30 is elevationally spaced from both the first and the second surfaces of the dielectric support member 20 (fig. 1).

Regarding claim 61, AAPA discloses the semiconductor package wherein the at least one contact pad 30 comprises at least two conductive layers (32 and 34; ¶ [0006]), fig. 1.

Regarding claim 66, AAPA discloses the semiconductor package wherein each solder ball 36 is in physical contact with one contact pad 30 (fig. 1).

Regarding claim 67, AAPA discloses the semiconductor package wherein a portion of each solder ball 36 rests in one of the openings (fig. 1).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 3, 4, 60 and 65 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art (AAPA), as applied to claim 7 above, in view of Huang (US 6,218,731).

Regarding claim 3, AAPA discloses all the limitations of the claim with the exception of disclosing: wherein the dielectric support member is not a photomask material. However, Huang discloses a semiconductor package in fig. 2, wherein a dielectric support member 30 comprises a resin material (col. 2, ln. 3). Resin materials are well known and typically used in semiconductor packages because of their good dielectric properties.

Regarding claim 4, AAPA discloses all the limitations of the claim with the exception of disclosing: wherein the one or more circuit traces comprise copper. However, Huang discloses a semiconductor package in fig. 3A, wherein the circuit traces 31 comprise copper (col. 2, Ins. 5-7), which is a well known conductive material that provides electrical connections in semiconductor packages.

Regarding claim 60, AAPA discloses in fig. 1, wherein the package further comprises an adhesive structure 16 directly contacting the semiconductor die 12 and comprised of a dielectric material (§§ [0004]). AAPA does not disclose wherein the adhesive structure directly contacts the plurality of the circuit traces. However, Huang discloses a semiconductor package in fig. 3A, wherein an adhesive structure 122 contacts both the plurality of circuit traces 102 and the semiconductor die 116 (col. 3, Ins. 60-64). This would provide a more stable and reliable package, with reduced size.

Regarding claim 65, AAPA discloses in fig. 1, wherein the package further comprises an adhesive structure 16 directly contacting the semiconductor die 12 and comprised of a dielectric material (§§ [0004]). AAPA does not disclose wherein the adhesive structure directly contacts the dielectric support member. However, Huang discloses a semiconductor package in fig. 2, wherein an adhesive structure 122 contacts both the dielectric support member 30 and the semiconductor die 12. This would provide a semiconductor package with reduced pitch and size.

Therefore, it would have been obvious to one of ordinary skill in the art, at the time of the invention, to incorporate the teachings of Huang into the device of AAPA,

because of the advantages set forth above. Furthermore, such modifications are considered well known and conventional in the art of semiconductor devices.

4. Claims 62-64 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA, as applied to claim 7 above, in view of Yee et al. (US 2003/0230799).

Regarding claims 62 and 63, AAPA teaches all the limitations of the claim with the exception of disclosing wherein the interposer has a thickness comprising a range from about 15 μm to about 150 μm (claim 62) and wherein the interposer has a thickness comprising about 50 μm (claim 63).

However, Yee discloses a semiconductor package (Fig. 1) comprising an interposer 12 with a thickness in range from about 20 μm to about 150 μm (§ [0047]). Note, where patentability is said to be based upon a particular chosen range or dimension recited in a claim, the Applicant must show that the chosen range or dimension is critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990). Furthermore, it is not inventive to discover optimum or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 105 USPQ 233, 234 (CCPA 1955).

Therefore, it would have been obvious to one of ordinary skill in the art, at the time of the invention, to incorporate the teaching of Yee into the device of AAPA, thereby having a thickness of the interposer in such a range as claimed, because the range is not critical since it can be optimized during routine experimentation, depending upon the desired size of the package.

Regarding claim 64, AAPA teaches all the limitations of the claim with the exception of disclosing wherein the single dielectric support member comprises at least one of polyimide and liquid polymer crystal.

However, Yee discloses that a dielectric support member 12 used for an interposer may comprise polyimide film or liquid crystal polymer.

Therefore, it would have been obvious to one of ordinary skill in the art, at the time of the invention, to incorporate the teaching of Yee into the device of AAPA, thereby forming the dielectric support member from polyimide or liquid crystal polymer, because such materials are well known the art for their flexibility.

Response to Arguments

5. Applicant's arguments filed April 7, 2008, have been fully considered but they are not persuasive.

With respect to claim 7 and Applicant's Admitted Prior Art (AAPA) in Fig. 1, Applicant argues:

"AAPA does not disclose 'the entire structure of the single dielectric support member is a single layer of dielectric material' as positively recited by independent claim 7."

The argument is not persuasive because, Fig. 1 of AAPA clearly shows a single dielectric support member 20, wherein the entire structure of the single dielectric support member 20 is a single layer of dielectric material (¶ [0004]-[0005]). Note that layer 20 reads on all the limitations drawn to the dielectric support member, as recited in claim 7.

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Abul Kalam whose telephone number is (571)272-8346. The examiner can normally be reached on Monday - Friday, 9 AM - 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy can be reached on 571-272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/A. K./
Examiner, Art Unit 2814

/Phat X Cao/
Primary Examiner, Art Unit 2814